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REMARKS

Claims 1, 2, 6 through 10, 24 through 30, 32, 33, and 36 through 39 are pending. Claims 3 through 5, 11 through 23, 31, 34, 35, and 40 to 45 have been cancelled in this national phase conversion under 35 U.S.C. 371(c) of PCT/GB03/01283 without prejudice or disclaimer. Claims 1, 2, 6 through 10, 24 through 30, 32, 33, and 36 through 39 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 3,945,358 granted to Collins ("Collins") in view of U.S. Patent 2,173,303 granted to Koehler ("Koehler"), and also under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,553,574 granted to Duncalf ("Duncalf") in view of Koehler.

The Examiner asserts that Collins discloses all of the features of claim 1 of the current application, except for the shape of the cam member. However, that is not the case and Collins actually differs in a more fundamental manner. The engine of Collins has a number of slideably mounted cylinders forming combustion chambers in combination with stationary pistons (lines 47 through 53 of column 1). In contrast, claim 1 includes a moveable piston mounted in a stationary cylinder (see lines 19 through 21 of claim 1), which is a very different mechanism. Claim 1 is therefore novel not only due to the shape of the recess, as admitted by the Examiner, but also due to the moving piston arrangement.

In order to arrive at the present invention the person skilled in the art would not only have to modify the shape of the recess, as suggested by the Examiner, but also would have to make very substantial modifications to the engine of Collins to provide a movable piston arrangement. Not only is there nothing in Collins to suggest making such modifications, but additionally, the fundamental change involved in the nature of the engine would, it is submitted, discourage the modification.

The Examiner asserts that the person skilled in the art would look to Koehler and use the disclosure therein to modify the cam shape of Collins to arrive at the current invention. However, as explained in detail below, the Collins engine, so modified, would have degraded performance in relation to the unmodified Collins engine.

As seen in Figure 1 of Collins, the axis of movement of the cylinders of Collins is offset from the axis of rotation of the rotor (see also lines 20 through 24 of column 1). As the rotor rotates it pushes the cylinders outwards during their compression stroke, via roller 29 and cog 32 acting on the

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rotor. However, if the rotor shape were modified as suggested by the Examiner, during that compression stroke the surface of the rotor would be largely parallel to the axis of movement of the cylinder. The force applied by the rotor would thus be largely perpendicular to the axis of movement. The enclosed Figure A is a copy of Figure 1 of Collins, but with a rotor with a narrowed midsection superimposed. It can clearly be seen that the section of the modified rotor marked with an asterisk lies largely parallel to the axis of cylinder E. The rotor is rotating clockwise in that figure and so is pushing cylinder E outwards in the marked region, but the surface of the rotor is largely perpendicular to the axis of movement. As will be understood by the person skilled in the art such an arrangement would lead to increased lateral forces, increased friction and reduced force in the direction of movement of the cylinder; all of which serve to provide an engine with degraded performance in comparison with an unmodified Collins engine.

In contrast, in the engine shown in Figure 1 of the application, the axis of movement of the pistons is aligned with the axis of rotation of the cam member and the problems described above are not, therefore, encountered.

It is submitted that, from the teachings of Collins, modifying the rotor shape as suggested by the Examiner would be perceived by the skilled person to be undesirable and, in any case would not provide the arrangement disclosed and claimed in the present application. The present invention is therefore not made obvious by Collins and Koehler. This also applies to the cam member of claim 36.

The Examiner also asserts that Duncalf discloses all of the features of claim 1, apart from the specific shape of the slot. This is not, however, the case. Claim 1 includes that a guide recess has an inner periphery and an outer periphery and that that recess guides a pin member, but Duncalf does not have such a recess. The guide member of Duncalf is shown in Figure 3, in which it is clear that the guide member actually has two inwardly facing surfaces (38b) and one outwardly facing surface (38a) (lines 38 through 41, column 9). These surfaces guide three cam followers (40, Figure 12) with the outer followers acting on the inwardly facing surfaces to pull the piston down, and the inner follower acting on the outwardly facing surface to rotate the cam on the power stroke (46 through 48, column 9). Claim 1 is therefore novel not only by virtue of the shape of the recess, as admitted by the Examiner, but also by virtue of the provision of a recess having an inner and an outer surface guiding a pin member, which is not disclosed by Duncalf.

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Turning to the issue of the shape of the recess, Duncalf states that the shape of the cam has been specifically designed to cause the piston to move with a constant acceleration (lines 64 through 66 of column 9). Duncalf states specific advantages of such a cam shape (minimization of forces and provision of a dwell time (line 66 of column 9 to line 7 of column 10)) and also that other cam shapes are "less desirable" (lines 10 through 13 of column 10). Duncalf specifically teaches that the cam shape is the optimum one and describes in detail (line 14, Column 10 to line 49, Column 12) how a suitable cam shape can be designed for a range of parameters. Modifying the cam shape of Duncalf as suggested by the Examiner would therefore go directly against the teachings of the document and accordingly the person skilled in the art would not make such modifications. Claim 1 is therefore not made obvious by Duncalf which exhorts the skilled man not to depart from the teachings of Duncalf. This applies equally to the cam member of claim 36.

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CONCLUSION

In view of the foregoing remarks and for various other reasons readily apparent, Applicants submit that all of the claims now present are allowable, and withdrawal of the rejection and a Notice of Allowance are courteously solicited.

If any impediment to the allowance of the claims remains after consideration of this amendment, and such impediment could be alleviated during a telephone interview, the Examiner is invited to telephone the undersigned at (214) 953-5990 so that such issues may be resolved as expeditiously as possible.

No additional fee is believed to be due. If any applicable fee or refund has been overlooked, the Commissioner is hereby authorized to charge any fee or credit any refund to the deposit account of Jackson Walker L.L.P., No. 10-0096.

Respectfully submitted,

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